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ABSTRACT

One of five modules in the curriculum development series of the 16-module series designed to train vocational education curriculum specialists, this module is intended for use in classes or individual study arrangements at the preservice or inservice level by students with varying amounts of experience in vocational education. (These modules are revised versions of earlier study guides--see note.) Introductory materials include an overview, instructions to the learner, detailed list of behavioral goals and objectives, and resources needed to complete learning activities. The module is divided into two sections, each based on one of the goals. Two general activities associated with objectives are dealt with. Section 1 concerns derivation of objectives for instruction, including location or development of general job description, task analysis, selection of tasks for instruction, description of target population, and determination of course prerequisites. Section 2 focuses on specification of objectives, including writing objectives and selecting their content. Each section follows a standard format: text, individual study activities, discussion questions, and group activities. A summary of the module follows. Appendixes include a description of the Dictionary of Occupational Titles coding system, suggested responses to the study activities, a self-check, responses to the self-check, and recommended references. (YLB)

ED215124

VOCATIONAL EDUCATION CURRICULUM SPECIALIST

CONDUCTING TASK ANALYSES AND

DEVELOPING INSTRUCTIONAL OBJECTIVES

Module 8

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

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CONDUCTING TASK ANALYSES AND

DEVELOPING INSTRUCTIONAL OBJECTIVES

Module 8

Judith A. Appleby

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INTRODUCTION

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Introduction

After a needs assessment has been conducted, the actual curriculum development process begins. The purpose of this module is to provide information, activities, and experiences that will assist the vocational education curriculum specialist in writing instructional objectives for a unit of instruction.

A variety of approaches to curriculum development are in practice in vocational education today. This series of modules follows an occupational or job analysis approach to the development of instructional objectives.

Overview

The literature on objectives is filled with a variety of terms that seem to mean essentially the same thing. Such terms include: "instructional objective," "learning objective," "performance objective," "behavioral objective," "measurable objective," "operational objective," and possibly others. Very often the particular term used represents author preference rather than a basic difference in meaning among the terms. This module uses the term "instructional objective," when referring to the type of objective that attempts to define exactly what, how well, and under what circumstances a student will be able to perform as a result of instruction.

One of the important competencies a curriculum specialist must possess is the ability to specify instructional objectives in measurable terms. To be effective, the curriculum specialist must interpret broad educational goals in ways that communicate the intent of a course (or an instructional unit) to all concerned--students, teachers, administrators, and parents.

Objectives in vocational education exist at a variety of levels: national, state, institutional, program, and classroom. This module is concerned with objectives at the classroom level--specifically, with the objectives for a course or a unit of instruction. These objectives represent the "blueprint" of student performance, describing what the student should be able to do at the end of a course or upon completion of an instructional unit.

This module deals with two general activities associated with objectives: derivation and specification. Derivation concerns procedures both for identifying possible objectives for instruction and for deciding which objectives ought to be selected. These procedures include the location or development

of a general job description; task analysis; the selection of tasks for instruction; description of the target population; and determination of course prerequisites. Specification refers to the process of writing good objectives and the process of selecting the content to be included in them. This detailed content usually includes a statement of the specific behavior expected of the student upon completion of instruction; the important conditions under which student behavior is to occur; and the criteria or standards of acceptable performance.

Instructions to the Learner

The Self-Check items and possible responses to them are found in the appendices. These questions have two purposes. First, before you begin work on the module, you may use them to check quickly whether you have already learned the information in previous classes or readings. In some instances, with the consent of your instructor, you might decide to skip a whole module or parts of one. The second purpose of the Self-Check is to help you review the content of modules you have studied in order to assess whether you have achieved the module's goals and objectives.

You can also use the list of goals and objectives that follows to determine whether the module content is new to you and requires in-depth study, or whether the module can serve as a brief review before you continue to the next module.

Goals and Objectives

Goal 1: Perform the necessary steps for systematically deriving instructional objectives.

Objective 1.1: Locate or write a job description for a specific occupation.

Objective 1.2: List and detail the tasks for a specific occupation.

Objective 1.3: Select occupational tasks for school instruction.

Objective 1.4: Determine major characteristics of the target population.

Objective 1.5: Determine course prerequisites.

Goal 2: Specify instructional objectives.

Objective 2.1: State the importance of specifying instructional objectives.

Objective 2.2: Identify the components of an instructional objective.

Objective 2.3: Develop instructional objectives for specific occupational tasks.

Objective 2.4: List five sources for obtaining existing objectives.

Resources

In order to complete the learning activities in this module, you will need information contained in the following publications:

Dictionary of occupational titles. Bureau of Labor Statistics, U.S. Department of Labor.

Mager, R. F. Preparing instructional objectives (2nd ed.). Belmont, CA: Fearon Publishers, 1975.

Mager, R. F., & Beach, K. M. Developing vocational instruction. Belmont, CA: Fearon Publishers, 1967.

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GOAL 1: Perform the necessary steps for systematically deriving instructional objectives.

Deriving Instructional Objectives

When following an occupational or job analysis approach, the first step in deriving instructional objectives is to locate or prepare a job description. The job description provides the basis for a detailed task analysis. Tasks to be taught in the classroom are then selected from the detailed task analysis. Finally, course prerequisites are established based on student and task characteristics.

Job Description

To determine the instructional objectives that contribute to successful job performance, it is first necessary to define the job clearly. Job descriptions vary in format. However, the usual components are:

- location and working conditions;
- a statement of job functions and relationships with other jobs;
- general duties;
- possible contingent responsibilities; and
- simply stated job tasks.

The description should be a general statement of what a person does when performing the job, and it should tell something about the conditions under which that person does them. Such job descriptions can be found in the Dictionary of Occupational Titles (DOT), a publication developed and prepared by the U.S. Employment Service for individuals concerned with the use of occupational information in vocational, personnel, and related services and activities.

The DOT does not reflect all possible jobs. With advancing technology and rapid occupational change in our society, jobs are constantly becoming obsolete while new jobs are being created. Also, most of the jobs in the DOT are defined in broad, all-inclusive terms. Therefore, not all definitions can be expected to coincide exactly with specific jobs in a particular establishment or in a given locality. To have the greatest local applicability, the job definitions should be supplemented with information concerning specific jobs in the community. If you are unable to locate a job description in the DOT, you will have to seek another source or write the job description yourself. A more detailed description of the DOT appears in the appendices to this module.

Task Analysis

Once a job description is available, it must be expanded by specifying tasks that an employer would normally expect from an employee engaged in doing the job. A task generally requires some combination of skills and knowledge, as well as both physical and mental action on the part of the worker. Each task has a definite starting and stopping point; it is the smallest unit of job activity having a specific purpose. A job may consist of only one task or it may be composed of a series of interdependent tasks. In the latter case, the tasks normally must be completed in proper sequence if the job is to be done satisfactorily. Tasks, then, are the step-by-step process of completing a job. The process of determining these tasks is called task analysis.

A task analysis is the basis for vocational instruction. The process involves starting with the basic job and breaking it down into successively more detailed components or levels. The purpose of the process is to obtain an adequate definition of the job so that effective instructional objectives and learning activities can be devised to teach the occupation to a willing student.

The curriculum specialist must be trained to recognize the least detailed level to which a task analysis should be taken so that effective instruction will result and unnecessary task detailing will be avoided. The curriculum specialist's perception of community needs, and his or her estimation of the capabilities of his or her staff to design the necessary instruction, will likely be the primary factors in the decision.

According to Mager and Beach (1967), "There are probably as many techniques for performing a task analysis as there are people doing it." Such techniques range from the very simple

to the highly sophisticated (and the very time-consuming); however, the practicality of the work situation will determine the task analysis technique to be used. The following technique described by Mager and Beach is appropriate for the practicing vocational educator.

A first step in performing a task analysis is to locate any existing task analyses for the occupation under consideration. This involves searching publications, indexes, catalogs, and other references. Possible sources for task analyses include:

- Publications of the American Association of Community and Junior Colleges (Washington, D.C.: American Association of Community and Junior Colleges). This current list of publications includes guidelines for program planners, facility guides, curriculum guides, and a wide variety of assorted publications useful to those responsible for initiating and conducting post-secondary vocational and technical education programs.

- The National Center for Research in Vocational Education at the Ohio State University has some task statements. These are available through the Education Resources Information Center (ERIC) system.

- Many curriculum guides contain some type of task analysis or job analysis. These vary in detail and completeness, but they can be useful.

- There are six federally funded curriculum coordination centers designed to provide technical assistance to vocational educators. The center contracts come up for competitive bidding at the rate of approximately two per year. The current locations of the curriculum coordination centers are listed below.

  (1) Western Curriculum Coordination Center
  College of Education
  University of Hawaii
  1776 University Avenue
  Honolulu, Hawaii 96822

  (2) East Central Curriculum Coordination Center
  100 North First Street
  Springfield, Illinois 62777

(3) Midwest Curriculum Coordination Center
Oklahoma State Department of Vocational and Technical Education
1515 West Sixth Avenue
Stillwater, Oklahoma 74074

(4) Southeast Curriculum Coordination Center
College of Education
Mississippi State University
Box 5365
Mississippi State, Mississippi 39762

(5) Northeast Curriculum Coordination Center
Bureau of Vocational Education
Division of Vocational Education
New Jersey Department of Education
225 West State Street
Trenton, New Jersey 08625

(6) Northwest Curriculum Coordination Center
Building 17 - Airdustrial Park
Olympia, Washington 98504

- The U.S. military has conducted numerous task analyses that may be obtained from the curriculum coordination centers listed above.

- The Human Resources Research Organization is an additional source of both military and civilian task analyses.

- The Mid-America Vocational Consortium (1515 W. 6th Avenue, Stillwater, Oklahoma, 74074) may be able to direct you to existing task analyses.

- The Vocational-Technical Education Consortium of States (V-Techs, 795 Peachtree St., N.W., Atlanta, Georgia, 30308) may also be able to provide you with suitable task analyses.

If task statements for a specific occupation are unavailable, the curriculum specialist will need to obtain this information directly from employees performing the tasks or from task supervisors.

The task statement: Action verb, object, and qualifier. A performance task usually generates a product or an observable change in the work environment. A job task statement, therefore, should begin with an action verb to indicate what a person does on the job. The action verb is then followed by the

object--the element that is acted upon. The object is followed by a qualifier, when applicable. The use of a qualifying phrase is optional but is desirable whenever needed to make a task statement more specific. Qualifiers may limit an action to a specific procedure or process or may identify a specific component or area of an object.

The task statements for a painter, for example, are broken into action verbs, objects, and qualifiers as shown here.

Action Verb	Object	Qualifier
refinishes	old and new surfaces	
selects	finishing material	
selects	appropriate brushes and rollers	
removes	trim and obstacles	before finishing
removes	existing finish from surfaces	when appropriate
fills	cracks and holes	with appropriate substitutes
mixes and thins	finishing material	to correct consistency
adds	color to finishing material	when necessary
selects and supplies	appropriate ground and furniture covering	
etc.		

Some action verbs are most useful when used with a particular type of content such as language behaviors, arts behaviors, and mathematical behaviors. The National College Verb List provided on the following pages presents sample verbs commonly used with different types of content. You may find this list a handy reference whenever you are writing task statements.

National College Verb List*
(Calvin K. Claus and students)

THE FUNCTIONAL, FORCEFUL FOUR HUNDRED FIFTY-FIVE

"Creative" Behaviors

Alter	Generalize	Question	Re-group	Re-phrase	Re-write
Ask	Modify	Re-arrange	Rename	Restate	Simplify
Change	Paraphrase	Re-combine	Re-order	Restructure	Synthesize
Design	Predict	Reconstruct	Re-organize	Retell	Systematize
				Revise	Vary

Complex, Logical, Judgmental Behaviors

Analyze	Combine	Contrast	Designate	Formulate	Plan
Appraise	Compare	Criticize	Determine	Generate	Structure
Assess	Conclude	Deduce	Discover	Induce	Suggest
		Defend	Evaluate	Infer	Substitute

General Discriminative Behaviors

Choose	Describe	Discriminate	Indicate	Match	Place
Collect	Detect	Distinguish	Isolate	Omit	Point
Define	Differentiate	Identify	List	Order	Select
				Pick	Separate

Social Behaviors

Accept	Answer	Co-operate	Forgive	Laugh	Reply
Admit	Argue	Dance	Greet	Meet	Smile
Agree	Communicate	Disagree	Help	Participate	Talk
Aid	Compliment	Discuss	Interact	Permit	Thank
Allow	Contribute	Excuse	Invite	Praise	Visit
			Join	React	Volunteer

Language Behaviors

Abbreviate	Call	Indent	Punctuate	Speak	*Tell
Accent	Capitalize	Outline	Read	Spell	Translate
Alphabetize	Edit	Print	Recite	State	Verbalize
Articulate	Hyphenate	Pronounce	Say	Summarize	Whisper
			Sign	Syllabicate	Write

"Study" Behaviors

Arrange	Circle	Diagram	Itemize	Mark	Record
Categorize	Classify	Find	Label	Name	Reproduce
Chart	Compile	Follow	Locate	Note	Search
Cite	Copy	Gather	Look	Organize	Sort
			Map	Quote	Underline

Music Behaviors

Blow	Clap	Finger	Hum	Pluck	Strum
Bow	Compose	Harmonize	Mute	Practice	Tap
			Play	Sing	Whistle

(continued)

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National College Verb List
(continued)

Physical Behaviors

Arch	Climb	Hit	March	Ski	Swim
Bat	Face	Hop	Pitch	Skip	Swing
Bend	Float	Jump	Pull	Somersault	Throw
Carry	Grab	Kick	Push	Stand	Toss
Catch	Grasp	Knock	Run	Step	Walk
Chase	Grip	Lift	Skate	Stretch	

Arts Behaviors

Assemble	Cut	Frame	Hold	Roll	Stamp
Blend	Dab	Hammer	Nail	Rub	Stick
Brush	Dot	Handle	Paint	Sand	Stir
Build	Draw	Heat	Paste	Saw	Trace
Carve	Drill	Illustrate	Pat	Sculpt	Trim
Color	Fold	Melt	Polish	Shake	Varnish
Construct	Form	Mix	Pour	Sketch	Wipe
			Press	Smooth	Wrap

Drama Behaviors

Act	Direct	Enter	Imitate	Pantomime	Respond
Clasp	Display	Exit	Leave	Pass	Show
Cross	Emit	Express	Move	Perform	Sit
				Proceed	Turn

Mathematical Behaviors

Add	Compute	Estimate	Integrate	Plot	Subtract
Bisect	Count	Extrapolate	Interpolate	Prove	Sum
Calculate	Cumulate	Extract	Measure	Reduce	Tabulate
Check	Derive	Graph	Multiply	Solve	Tally
Circumscribe	Divide	Group	Number	Square	Verify

Laboratory Science Behaviors

Align	Conduct	Dissect	Keep	Plant	Set
Apply	Connect	Feed	Lengthen	Prepare	Specify
Attach	Convert	Grow	Limit	Remove	Straighten
Balance	Decrease	Increase	Manipulate	Replace	Time
Calibrate	Demonstrate	Insert	Operate	Report	Transfer
				Reset	Weigh

General Appearance, Health and Safety Behaviors

Button	Comb	Eat	Fill	Taste	Unzip
Clean	Cover	Eliminate	Go	Tie	Wait
Clear	Dress	Empty	Lace	Unbutton	Wash
Close	Drink	Fasten	Stack	Uncover	Wear
			Stop	Untie	Zip

(continued)

National College Verb List
(continued)

Miscellaneous

Aim	Erase	Hunt	Peel	Scratch	Store
Attempt	Expand	Include	Pin	Send	Strike
Attend	Extend	Inform	Position	Serve	Supply
Begin	Feel	Kneel	Present	Sew	Support
Bring	Finish	Lay	Produce	Share	Switch
Buy	Fit	Lead	Propose	Sharpen	Take
Come	Fix	Lend	Provide	Shoot	Tear
Complete	Flip	Let	Put	Shorten	Touch
Correct	Get	Light	Raise	Shovel	Try
Crease	Give	Make	Relate	Shut	Twist
Crush	Grind	Mend	Repair	Signify	Type
Develop	Guide	Miss	Repeat	Slip	Use
Distribute	Hand	Offer	Return	Slide	Vote
Do	Hang	Open	Ride	Spread	Watch
Drop	Hold	Pack	Rip	Stake	Weave
End	Hook	Pay	Save	Start	Work

Selection of Tasks for Instruction

After detailed information has been collected about the requirements of a job, the next step is to select those tasks that are best taught in the classroom; this means deleting tasks that are best taught on the job (on-the-job training or OJT) and those that do not require any type of instruction or training.

In the early stages, the individual who is developing a course must be guided by his or her own judgment and past experience. Later, as the evaluation process feeds back information on instructional effectiveness, the course can be adjusted more objectively. However, until this feedback occurs, judgments should be made by people who know the curriculum and who know the kind of person likely to succeed in a particular job.

Reasons for selection for school instruction. A task selected for school instruction should meet at least one of the selection criteria listed below.

- Task is performed by large percentage of jobholders. Performance of a task by a large number of jobholders is a significant factor in substantiating its selection for school instruction unless the task is teachable on the job.

- Task is performed frequently. Although frequency is a factor in selection, some routine, simple tasks are performed so frequently that they are easily learned on the job. Normally, additional criteria should be used to support selection on the basis of frequency.

- Task is critical to job accomplishment. The more critical the task is to job accomplishment, the more suitable is its inclusion in school instruction. Task criticalness can usually be determined from job analysis, but the judgment of experienced jobholders and supervisors, obtained through interviews and questionnaires, can also be used to determine it.

- Task is essential in performance of another task. Although certain tasks may not be appropriate for school instruction, proficiency in their performance may be prerequisite to performing other tasks for which instruction is necessary. For example, the task of disassembling and assembling an item of equipment may very well be delegated to on-the-job training, whereas the tasks of identifying, removing, and

replacing defective parts in that item of equipment might be selected for school instruction. In this situation, then, since it is necessary to disassemble the item before defective components can be removed and replaced, the task of disassembly and assembly must be selected for school instruction.

- Task is required immediately upon entry into job. If performance of the task is necessary immediately upon entry--and other selection criteria also apply--then that task should be selected for school instruction.

Reasons for selection for on-the-job training. The following are criteria for deciding that the task should be learned on the job.

- Task is relatively easy to learn. Routine, simple tasks fall into this category, as do tasks that can be learned more efficiently in the job environment than the school environment.

- Task is performed infrequently.

- Task is performed by small percentage of jobholders. Although essential to the job, some tasks are performed too infrequently or by too few jobholders to justify the expense of school instruction.

Reasons for rejection. The following criteria are reasons for rejecting a task for either instruction or training. Either reason would be sufficient for rejection.

- Task can be performed without further instruction. Can the average student perform the task adequately without school instruction or on-the-job training? If so, the task should not be selected for either.

- Task is similar to other tasks selected for instruction. If similar performance requirements exist for different tasks within an occupation, the factor of duplication of instruction becomes significant in determining if the tasks should be chosen for school instruction or on-the-job training. For example, a major item of electronic equipment may contain several power supplies. Although each power supply is different, similar performance requirements for each task involved may allow an individual, trained to perform a task on one or two power supplies, to perform the same

task on the other, similar power supplies without further instruction.

In many cases, decisions to teach a task in school rather than train in it on the job will be relatively simple to make, due to known restrictions on personnel, equipment, facilities, or time. Similarly, many tasks clearly will be within the capabilities of on-the-job training. However, decisions that are not clear-cut--for example, decisions that school instruction is desirable but only because it is relatively more efficient than on-the-job training--could be subject to change later. Each task subject to such a marginal decision must be noted so that if constraints on school resources or course length dictate, the task can be converted to an on-the-job training requirement.

Description of Target Population

In addition to analyzing the requirements of the occupation for which you are developing a course of instruction, you must also consider the characteristics of students enrolled in the course. When describing these students you might consider the following:

- physical characteristics;
- education;
- motivation;
- interests;
- biases and prejudices; and
- specific knowledge, skills, and attitudes relevant to the subject of the course.

This information should help you determine what the students are likely to know already, what motivates them, and from which types of instruction they are most likely to benefit. Suggested methods for determining student characteristics include:

- interviewing students;
- asking students to fill out questionnaires; and
- observing students in the classroom.

Course Prerequisites

As the characteristics of the target population are determined and the course objectives are developed, the required entering behavior of the students becomes clear. And that is what prerequisites are--those abilities (knowledge, attitudes, and skills) that the instructor assumes the students already possess before they enter the learning situation.

There is much controversy in vocational education over the role and purposes of instructional program prerequisites. Some educators argue that all vocational programs should be open to all individuals regardless of their previous background and skills. Others argue that only persons most likely to succeed in an occupation should be allowed to enter occupational training programs. The federal legislation that provides funds for vocational education indicates that the purpose of vocational education is to provide all persons with "...ready access to vocational training or retraining which is of high quality, which is realistic in light of actual or anticipated opportunities for gainful employment, and which is suited to their needs, interests, and ability to benefit from training" (Vocational Education Act of 1963).

The problem facing the instructor or curriculum specialist is to determine which skills, knowledge, and work-related attitudes are essential prerequisites for that occupation. No doubt the overall productivity of a vocational program will be increased if people entering the program are highly selected. However, selecting only those who can be maximally successful in the occupation excludes many individuals who can also benefit to some degree from the instruction.

Areas of prerequisites for an occupational training course might include: physical characteristics, learning abilities, basic skills, work-related attitudes, and miscellaneous skills. Since any given course may require differing levels of a particular characteristic, it is useful to rate each of the prerequisite characteristics. Such a rating system is illustrated here.

A rating of "5" indicates that the student must have this characteristic well developed to succeed in the course. A rating of "1," on the other hand, indicates that the student can succeed in the course with a minimal amount of this characteristic.

Sample Welding Course Prerequisites

(Pucel & Knaak, 1975)

Physical	Learning Ability	Basic Skills	Work-Related Attitudes
a. arms (5)	a. learning speed (2)	a. reading(2)	a. people: coworkers (3) supervisors (3)
b. legs (5)	b. memory (3)	b. writing (2)	b. objects: tools (4) materials (3)
c. sight (5)	c. reaction time (4)	c. arithmetic (2)	c. safety (5)
d. hearing (3)			
e. speech (2)			
f. mobility (5)			

Using a form like this to list course prerequisites allows you to communicate to counselors, students, and others specifically what is expected of a student before she or he enters the course.

Individual Study Activities

1. After reading Chapter 2, "Job Description," in Mager, R. F., & Beach, K. M. Developing vocational instruction. Belmont, CA: Fearon Publishers, 1967, select an occupation that falls under one of the eight vocational education program areas: agricultural education, distributive education, health occupations, home economics, office occupations, technical education, trades and industry, or industrial arts. Then write a job description for that occupation. In selecting an occupation, you might consider one with which you are particularly familiar or one in which you have actually worked. List the various tasks that are involved as well as any special or unusual conditions under which the tasks are carried out.

2. Go to a library and locate a copy of the Dictionary of Occupational Titles (DOT). See if you can find a job description for the occupation you described in Activity 1. If you are able to locate a description, how does it compare with the one you wrote? If you are not able to locate a description, how might you explain the fact that it does not appear in the DOT?

NOTE: Activities 3-7 make use of worksheets reproduced on subsequent pages of this module.

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3. After reading Chapter 3, "Task Analysis," in Mager and Beach, Developing Vocational Instruction, list all the tasks that might be included in the job description you wrote for Activity 1. (If you have time, talk with someone actually working at the job; then watch this individual doing the job.) List all these tasks on the TASK LISTING SHEET. For each Task, indicate the frequency or performance, importance, and learning difficulty. When you have completed the TASK LISTING SHEET, answer the following questions.

   - Did you find the TASK LISTING SHEET useful? If not, how would you change it?

   - Have you ever used a form for task listing that you found particularly effective? If so, diagram that form. Be prepared to describe the advantages of this form in a small group discussion.

4. Transfer the tasks you listed in Activity 3 to the TASK STATEMENTS SHEET breaking the statements down into their component parts. If you are not happy with your original statements in Activity 3, rewrite them now. Use the National College Verb List to select a more appropriate action verb if you are not satisfied with your previous selection.

5. Now that you have listed the tasks that make up a given occupation, you should detail the steps involved in each of these tasks. For this activity, select one of the tasks from the TASK STATEMENTS SHEET you completed in the last activity. Then on the TASK DETAILING SHEET, list each of the steps involved in performing the task. After listing the steps, indicate the learning difficulty of each. If it is likely that the student will be able to perform the task before taking the course, indicate this in the Learning Difficulty column.

6. Using the task statements you formulated for the last two activities and the selection criteria in this module, complete the TASK SELECTION SHEET. For each task, determine whether it should be considered for school instruction, on-the-job training, or rejection and why. If you are uncertain as to whether a given task should be handled by school instruction or on-the-job training, use an asterisk (*). Only when you know the personnel, equipment, facilities, and time available for a given course will you be able to make a final determination.

7. After reading Chapter 6, "Course Prerequisites," in Mager and Beach, Developing Vocational Instruction, use the occupation you selected for previous activities in this section and complete the COURSE PREREQUISITES SHEET. Determine some of the specific characteristics a student should have upon entering a course that provides training for this occupation. After listing specific characteristics under each column, rate each one according to its degree of importance. Under normal course development circumstances, you would determine prerequisites as the other steps of course development were carried out.

TASK LISTING SHEET

Vocation: _____

No.	Task	Frequency of Performance	Importance	Learning Difficulty

TASK STATEMENTS SHEET

Vocation: _____

Action Verb	Object	Qualifier

TASK DETAILING SHEET

Vocation: _____

Task: _____

No.	Steps in Performing the Task	Learning Difficulty

TASK SELECTION SHEET

Vocation: _____

Task	School Instruction	On-the-job Training	Rejection

COURSE PREREQUISITES SHEET

Vocation: _____

Physical Characteristics	Learning Abilities	Basic Skills	Work-related Attitudes

8. After reading Chapter 4, "Target Population," in Mager and Beach, Developing Vocational Instruction, think of any one vocational course you have taught or observed at the secondary or community college level. Then attempt to describe the major characteristics of the students in this class. Use the categories enumerated by Mager and Beach as a starting point for your description of the target population. If you think of any other bases on which to describe the target group, include them here.

Discussion Questions

1. Once a job description for a specific occupation has been developed, can the curriculum specialist begin preparing training materials for that occupation?

2. Should vocational educators rely on job requirements provided by personnel offices in completing a task analysis?

3. What are the possible effects on the curriculum if student abilities and interests are not taken into consideration?

Group Activities

1. Collect a sampling of job descriptions from a variety of local employers, companies, and institutions. You might select a common occupation from one of the vocational education program areas (agricultural education, distributive education, health occupations, home economics, office occupations, technical education, trades and industry, or industrial arts) and collect job descriptions for this occupation.

   In small groups, discuss the variations in format of the job descriptions collected. What information do some job descriptions give that others do not? If job descriptions contain similar information, how is it handled? For example, do job responsibilities appear as precise behavioral statements ("the jobholder does exactly this"), or are the responsibilities defined in general terms?

2. The purpose of this activity is to illustrate some of the difficulties involved in determining job tasks by the interview method. Group into pairs; have each member of the pair interview the other regarding the specific tasks involved in an occupation at which the individual has worked. It is important to determine which tasks are necessary to know in order to gain entry into the occupation as opposed to those tasks that are nice to know but

are not initially necessary. Note these tasks on a sheet of paper. Afterwards, in small groups, discuss the various problems each member experienced in interviewing an individual to determine the specific tasks of an occupation.

If interviewers are skilled in the occupation for which they are interviewing jobholders, the task may be a relatively simple one. The interviewers may simply list the tasks of the occupation as they know them, show the list to the jobholders, and ask whether these listed tasks are actually being performed. The jobholders may then add to or delete from the list.

3. Divide into two teams and debate the issue of whether students should be turned away because they lack sufficient prerequisites for a course or program.

GOAL 2: Specify instructional objectives.

Specifying Instructional Objectives

Briefly discussed below are the history and the pros and cons of the movement toward stating instructional objectives. Various dimensions of instructional objectives are also examined.

Objectives in Retrospect

Since 1950 attempts have been made to state educational objectives in behavioral terms in order to facilitate curriculum evaluation and revision. These attempts came about because educational psychologists were convinced that if educators could define the goals of the schools in terms of observable behaviors, psychologists could construct instruments to measure and, perhaps, to evaluate these goals. In the 1960s measurable instructional objectives became widely advocated and increasingly used, primarily because of the programmed instruction movement. (Robert Mager's classic text, Preparing Instructional Objectives, was originally titled Preparing Objectives for Programmed Instruction.)

Importance of Instructional Objectives

Many reasons have been given for writing and using measurable instructional objectives. In addition to facilitating curriculum evaluation and revision, objectives can

- guide teacher planning,
- help students to structure and organize their own learning activities, and
- provide a means of communicating about the curriculum.

There are critics of instructional objectives as well as proponents. Some experts, who are equally committed to finding more effective means of instruction and evaluation, object to

the strategy proposed by proponents of instructional objectives. They worry that teachers and instructional designers will become bogged down at the objective-writing stage. A more profitable strategy, they suggest, may be to move directly from vague objectives to test items.

Other standard arguments against the use of measurable instructional objectives are listed below.

- Trivial learner behaviors are the easiest to operationalize, hence, the really important outcomes of education will be underemphasized.
- Prespecification of explicit objectives prevents the teacher from taking advantage of instructional opportunities unexpectedly occurring in the classroom.
- Measurability implies behavior that can be objectively, mechanically measured; hence, the approach tends to be dehumanizing.
- Measurability implies accountability; teachers might be judged on their ability to produce results in learners.
- It is far more difficult to generate precise objectives than it is to talk about objectives in our customarily vague terms.
- In evaluating the worth of instructional schemes, it is often the unanticipated results that are really important; prespecified objectives may make the evaluator inattentive to the unforeseen.

In any case, the following cautions should be kept in mind when using instructional objectives.

- The claimed effectiveness of precise instructional objectives remains to be demonstrated. On the other hand, there are no demonstrations that instructional objectives do not lead to the proposed benefits. The issue is simply unresolved at this time.
- When authors speak of the use of instructional objectives in evaluation, they are abbreviating the evaluation process. While objectives may be a first step toward developing a sound test, the sophisticated test instrument must often be more than a one- or two-sentence objective.

- Empirical research on the use of objectives is difficult because objectives are frequently based upon individual or group opinion.

- The literature on objectives is filled with a variety of terms (e.g., measurable goals and objectives, learning objectives, operational objectives) and discussions about objectives frequently occur on several levels of generality.

Various Dimensions of Instructional Objectives

Instructional objectives vary in components, kinds, specificity, time, and comprehensiveness. Each of these dimensions is discussed briefly below.

Components of an instructional objective. Many books have been written on instructional objectives. Most authors, however, define objectives according to Mager's three criteria. According to Mager (1975), an instructional objective states:

- an action performed by a student,

- the condition under which the performance is to occur, and

- the criteria of acceptable performance. For example: "Given a human skeleton (condition), the student must be able to correctly identify by labeling (action) at least 40 of the following bones (criteria)...."

In a similar manner, Kibler et al. (1970) define objectives in terms of five components:

- who is to perform the desired behavior,

- the actual behavior to be employed in demonstrating mastery of the objective,

- the result (that is, the product or performance) of the behavior that will be evaluated (for example, "an essay" or "the speech"),

- the relevant conditions under which the behavior is to be performed, and

- the standard that will be used to evaluate the success of the product or performance.

The particular language used in stating the objective is critical. Most authors pay special attention to the verb in the statement of an objective. Such nonobservable verbs as "think," "appreciate," "enjoy," and "know" are considered unacceptable. However, specific, observable action verbs such as "write," "assemble," and "state" are highly acceptable. Some authors have even provided illustrative lists of such verbs. The National College Verb List reproduced in this module is an example.

Kinds of objectives. Objectives have been categorized by many authors into three major types:

- Cognitive objectives: emphasis is on knowing, conceptualizing, comprehending, applying, synthesizing, and evaluating.
- Affective objectives: emphasis is on attitudes, values, and emotions.
- Psychomotor objectives: emphasis is on physical skills and dexterity.

Specificity of objectives. Various levels of specificity for objectives have been described. Krathwohl et al. (1965) classify objectives in a three-part scheme:

- global objectives can be refined into
- intermediate objectives (for a course), which in turn can be reduced to
- specific objectives, each representing a skill or concept.

Kibler et al. (1970) also suggest three levels of objectives:

- planning objectives, which are very specific;
- informational objectives, which are abbreviations of planning objectives; and
- broad educational objectives or goals.

Time frame of objectives. Objectives may be organized in a hierarchy in which each successive objective can be reached only if the learner has acquired competence in previous objectives. Objectives may also vary from immediate, short-term, or end-of-course goals to long-range or life goals.

Comprehensiveness of objectives. A common source of confusion in statements of objectives is whether statements represent the whole of the desired terminal behavior or only samples or symptoms. Traditional goal statements are usually attempts at delimiting whole goals. The more specific Mager-like statements often tend, like test items, to represent samples.

Sources of Existing Objectives

Writing instructional objectives is a time-consuming process. In a real-world situation, you or the individual you are assisting may not have the time to prepare your own. In that case, you have an alternative. You may choose from existing objectives. Listed below are several sources of ready-made objectives.

- Byers, E. E., & Huffman, H. H. Writing performance goals: Strategy and prototypes. New York: McGraw-Hill, 1971. Besides providing detailed instructions on how to write performance objectives, this book contains prototypes of objectives in six fields of vocational education, including technical education. It also shows how task sequences can be established.

- Pouillotte, C. A., & Peters, M. G. (Eds.). Behavioral objectives: A comprehensive bibliography. Boston, Mass.: Instructional Technology Information Center, Division of Instructional Media, Office of Educational Resources, Northeastern University, 1971. This comprehensive bibliography references scores of objectives in areas ranging from foreign languages to performing arts. In addition, the bibliography includes references to published objectives that are available for different academic levels--for example, secondary, community college, and special education. Many of these documents are available through the ERIC Clearinghouse system.

- Journals devoted to a discipline, such as the Journal of Medical Education or VocEd, occasionally include articles which describe specific objectives for an area of their curriculum. The literature on educational research--like the Encyclopedia of Educational

Research and Review of Educational Research--may also provide you with objectives.

- Sometimes professional associations interested in education in a specific discipline issue sets of instructional objectives for their area; one example is the National Association of Industrial and Technical Teacher Educators.

- Curriculum guides and guides accompanying textbooks or other teaching materials may provide objectives.

Individual Study Activities

1. Read Chapter 5, "Course Objectives," in Mager, R. F., & Beach, K. M. Developing vocational instruction. Belmont, CA: Fearon Publishers, 1967.

   - From your knowledge of instructional objectives, what do you see as their major importance?

   - Do you agree with the position stated by Mager and Beach? If so, why? If not, why?

2. Read Mager, R. F. Preparing instructional objectives (2nd ed.). Belmont, CA: Fearon Publishers, 1975. It's a self-instructional book, so be sure to complete the learning activities as you go along. When you have finished, answer the multiple-choice questions below.

   - Each of the following items represents a component of an instructional objective. Indicate which component each item represents by marking an "X" at the appropriate choice.

   (1) "given an IBM Selectric typewriter and a cartridge-type ribbon"

   ___ a. target audience

   ___ b. behavior or action

   ___ c. condition of performance

   ___ d. criterion or standard of performance

   (2) "graphic arts trainees operating an offset printing press"

   ___ a. target audience

   ___ b. behavior or action

   ___ c. condition of performance

   ___ d. criterion or standard of performance

   (3) "replace automobile front disc brake pads"

   ___ a. target audience

   ___ b. behavior or action

___ c. condition of performance

___ d. criterion or standard of performance

(4) "answer correctly 100% of shop safety test questions"

___ a. target audience

___ b. behavior or action

___ c. condition of performance

___ d. criterion or standard of performance

(5) "an allied health trainee with no previous training or experience in medical occupations"

___ a. target audience

___ b. behavior or action

___ c. condition of performance

___ d. criterion or standard of performance

(6) "develop a set of working plans for a mountain cabin"

___ a. target audience

___ b. behavior or action

___ c. condition of performance

___ d. criterion or standard of performance

(7) "given a test bench, an ohmmeter, an electrical circuit, and a diagram"

___ a. target audience

___ b. behavior or action

___ c. condition of performance

___ d. criterion or standard of performance

(8) "complete the task in 10 minutes"

___ a. target audience

___ b. behavior or action

___ c. condition of performance

___ d. criterion or standard of performance

(9) "set a table for a two-course luncheon for four persons, two of whom are children"

___ a. target audience

___ b. behavior or action

___ c. condition of performance

___ d. criterion or standard of performance

(10) "complete the job at a rate of 1-1/2 acres per hour"

___ a. target audience

___ b. behavior or action

___ c. condition of performance

___ d. criterion or standard of performance

(11) "using a rolling coulter"

___ a. target audience

___ b. behavior or action

___ c. condition of performance

___ d. criterion or standard of performance

(12) "the retail sales trainee"

___ a. target audience

___ b. behavior or action

___ c. condition of performance

___ d. criterion or standard of performance

3. Now you should be ready to try writing your own instructional objectives. Use the TASK SELECTION SHEET you developed for Goal 1 as a guide. This sheet tells you which tasks you selected for school instruction, and these are the only tasks you need be concerned with in developing instructional objectives. Also refer to the COURSE

PREREQUISITES SHEET you prepared for Goal 1. This form tells you what knowledge, attitudes, and skills you expect students already to have upon entering your course. You need not be concerned with writing objectives for behaviors you assume students possess.

An OBJECTIVES SPECIFICATION SHEET is provided on the next page as an aid in writing your objectives. Enter the vocation and then the specific task you are considering at the top of the sheet. Beneath the task, write your objectives describing in more detail what the student will be expected to do at the end of the course in relation to that task. Consider the knowledge, performance skills, and attitudes necessary for accomplishing that task and write objectives in each of these areas if appropriate (a task may not always require objectives in each of these areas). You may not have the time to write objectives for each task selected for school instruction. Be sure, however, to complete objectives for at least three tasks. (You will need to prepare an OBJECTIVES SPECIFICATION SHEET for each task. Adequate space is not provided in this module, so use additional sheets of paper as necessary.)

4. Instructional developers use various forms for preparing their instructional objectives. Did you find the OBJECTIVES SPECIFICATION SHEET useful in organizing the objectives for a given task? If not, why not?

5. The purpose of this activity is to give you an opportunity to locate sources of existing objectives for one of the vocational education program areas. From the list of program areas below, select one area and locate five specific sources of instructional objectives for this area.

   - Agricultural Education
   - Distributive Education
   - Health Occupations
   - Economics Occupations
   - Office Occupations
   - Technical Education
   - Trades and Industry
   - Industrial Arts

OBJECTIVES SPECIFICATION SHEET

Vocation: _____

Task: _____

Cognitive Domain (knowledge)
Psychomotor Domain (performance skills)
Affective Domain (attitudes)

Discussion Question

1. The degree of specificity of objectives is a controversial topic. Different audiences or functions call for differentially specific objectives. How do certain needs and certain persons determine the level of specificity for objectives?

Group Activities

1. Interview several vocational instructors regarding the use of instructional objectives in their classrooms. Possible questions you might ask include:

   - What term do you prefer for objectives? (Answers might include: instructional objectives, behavioral objectives, etc.) Do you use these terms synonymously, or does each have a special meaning?
   - Do you develop your own objectives, rely on existing ones, or do you prefer not to use any objectives at all?
   - If you develop at least some of your own objectives, what basic components do you use?
   - What author, if any, do you use as a basis for developing your objectives?
   - What are your general feelings regarding the importance of objectives?
   - How do students respond to the use of objectives in your classroom? Do they find them useful, or do they find them just another instructional concept with which they have to cope?

   In small groups, discuss the results of your interviews.

2. Divide into groups of two teams each to debate the value of measurable instructional objectives. One team will represent the proponents of objectives while the other team will represent the opponents.

   The material in Goal 2 of this module has pointed out some of the reasons for and against using measurable instructional objectives. Can you think of other reasons?

SUMMARY

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Summary

After a needs assessment has been conducted and a vocational program is planned and organized, the actual curriculum development process begins.

In this module, you learned that before you write instructional objectives, you should locate or write a job description for the occupation to be taught; detail the tasks of the occupation; select the tasks for which school instruction can appropriately be provided; determine the major characteristics of the target population; and establish course prerequisites. You had the opportunity to practice doing these steps.

You then learned to write specific instructional objectives in measurable terms for the occupation you selected. You learned why it is important to specify objectives, and you also learned about the concept of objectives as it has developed over the years.

APPENDICES

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THE DICTIONARY OF OCCUPATIONAL TITLES (DOT)

The Dictionary of Occupational Titles (DOT) is a standard source of occupational information put out by the U.S. Department of Labor. The following pages, from the DOT, describe the coding system in detail.

The *Dictionary of Occupational Titles* is an outgrowth of the needs of the public employment service system for a comprehensive body of standardized occupational information for purposes of job placement, employment counseling and occupational and career guidance, and for labor market information services. In order to implement effectively its primary assignment of matching jobs and workers, the public employment service system requires a uniform occupational language for use in all of its offices. This is needed to compare and match the specifications of employer job openings and the qualifications of applicants who are seeking jobs through its facilities.

The need for this type of occupational descriptive information was recognized in the mid-1930's, within a few years after the passage of the Wagner-Peyser Act, establishing a Federal-State employment service system. An occupational research program was initiated, as one facet of public employment service operations, using analysts located in several field stations scattered throughout the country to collect the information required. Based on these data, the first edition of the *Dictionary of Occupational Titles* was published in 1939.

That edition contained a total of almost 17,500 concise definitions presented alphabetically, by title, with a coding arrangement for occupational classification. Blocks of jobs were assigned 5- or 6-digit codes which placed them in one of 550 occupational groups and indicated if the jobs were skilled, semi-skilled or unskilled.

Comprehensive updates of the *Dictionary* were issued in 1949, with the release of the second edition of the DOT, and in 1965 when the third edition was published. The second edition reflected, to some extent, the impact of World War II on jobs in the U.S. economy. To fill the widening gap between occupational information needed and that available, several supplements to the 1939 edition were issued throughout the war period. By 1945, with the release of the third and final supplement to the first edition, a total of more than 6,100 new occupational definitions had been published.

The revised second edition, issued in March 1949, combined material in the first edition with its supplements. It was also expanded to include new occupations in the plastics, paper and pulp, and radio manufacturing industries.

Material used in conjunction with the second edition included information, which was first released in a World War II supplement, relating to occupational classification of entry applicants with no previous work experience. This was done through a secondary occupational coding system—the Entry Occupational Classification Structure. Under that coding structure, jobs were grouped in terms of factors that could indicate the applicant's readiness and preference for specific jobs.

The third edition eliminated the previous Departmental designation of certain jobs as being "skilled, semi-skilled or unskilled," and substituted a classifica-

tion system based both on the nature of the work performed and the demands of such work activities upon the workers. These indicators of work requirements included eight separate classification components: training time, aptitudes, interests, temperaments, physical demands, working conditions, work performed, and industry.

The 1977 edition is the result of continued research on the changing occupational structure of the American economy, conducted by the U.S. Employment Service and job analysts in affiliated State Employment Service Occupational Analysis Field Centers throughout the country. Users of the third edition should have no difficulty in making the transition to this volume. None of the changes introduce content or concepts unfamiliar to users of the previous edition. This edition retains the breakdown of occupations into categories, divisions, and groups, although the occupational codes for some divisions and groups have been revised. Worker functions ratings, first introduced in the third edition, have been retained as well. However, for many occupational titles, the three middle digits of the 9-digit occupational code have been changed to reflect actual worker functions ratings. The changes in the new edition are designed to establish a broader occupational base for such purposes as classifying job applications and job orders, making referrals, assessing worker transferability into related jobs, or relocating workers displaced by technological change.[1]

The material included in the third edition of the DOT was compiled mostly in the early 1960's or even earlier. The rapid changes in industrial technology since that time have been accompanied by significant modifications in the characteristics and job requirements of many occupations. To keep abreast of these developments, analysts on State Occupational Analysis Field Center staffs, as part of the Employment Service occupational analysis program, make on-site job analyses of the spectrum of jobs in various industries to verify or revise the definitions of occupations listed in the DOT. These job analyses are designed to insure that the job definitions listed in the DOT are not based on obsolescent industrial practices which are no longer commonly used in the production of goods and services in the United States.

The fourth edition is based on more than 75,000 such on-site analyses conducted from 1965 to the early- and mid-1970's, and on extensive contacts with professional and trade associations. These activities were designed to reverify and reevaluate the job content and definitions of the occupations listed in the DOT and to identify new occupations. As a result of this program, over 2,100 new occupational definitions were added and some 3,500 deleted as compared with the third edition. Many thousand other descriptions were substantially modified or combined with closely related definitions to eliminate overlap and duplication, and to reflect the consolidation and restructuring of some occupations. The fourth edition contains approximately 20,000 jobs, about 1,800 less than in the third edition.

As this edition goes to press, a number of State employment service offices are computerized; most are not. Over the next half dozen years, the Employment Service will operate partly in a manual, and partly in a computerized mode. Changes in the new edition of the *Dictionary* were minimized to take account of this transition period. In future editions, after computerization is completed, refinements and innovations will be introduced which should help integrate the basic concepts in the DOT with the supplementary occupational classifica-

[1]See p. xxiv for a more detailed comparison of the third and fourth editions.

tion tools used in computerized job matching, such as the *Handbook of Occupational Keywords.*

The occupational codes and titles used in this edition should also permit a more effective interchange of occupational data among government agencies. Work was underway in 1977 to relate the classification system in the *Dictionary* to other government occupational language systems such as those of the Bureau of the Census, the Bureau of Labor Statistics, the U.S. Office of Education, and the Office of Management and Budget, Standard Occupational Classification (SOC) program. A joint project of the Labor and Defense Departments already has related occupational titles in the *Dictionary* to those in the military service in order to smooth the transition of persons between military and civilian life. A supplement to the *Dictionary*, in preparation as this edition went to press, is designed for use by the Social Security Administration as a guide to possible new careers for disabled workers and to determine benefit eligibility.

In using the *Dictionary*, one should note that the U.S. Employment Service has no responsibility for establishing appropriate wage levels for workers in the United States, or setting jurisdictional matters in relation to different occupations. In preparing job definitions, no data were collected concerning these and related matters. Therefore, the occupational information in this edition cannot be regarded as determining standards for any aspect of the employer-employee relationship.

Parts of the Occupational Definition

Work is organized in a variety of ways. As a result of technological, economic and sociological influences, nearly every job in the economy is performed slightly differently from any other job. Every job is also similar to a number of other jobs.

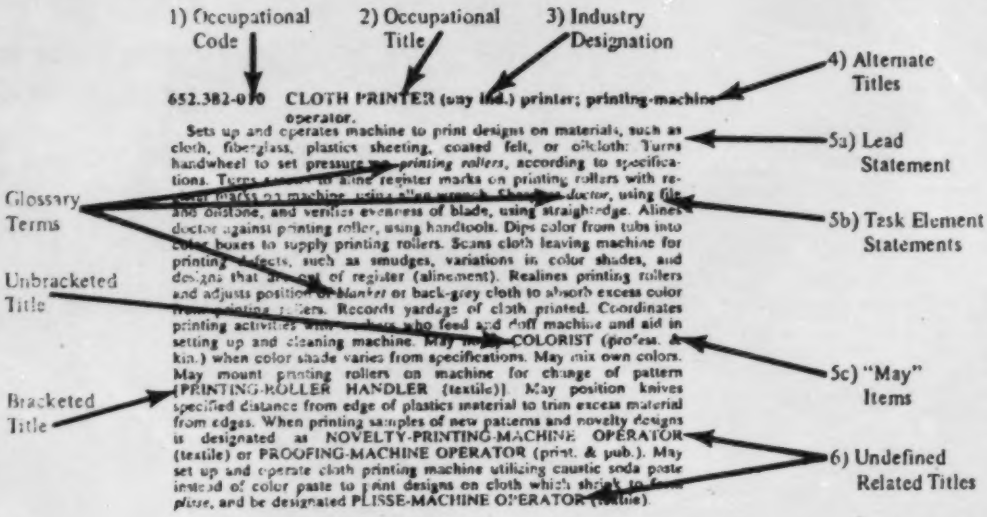
In order to look at the millions of jobs in the U.S. economy in an organized way, the DOT groups jobs into "occupations" based on their similarities and defines the structure and content of all listed occupations. Occupational definitions are the result of comprehensive studies of how similar jobs are performed in establishments all over the nation and are composites of data collected from diverse sources. The term "occupation," as used in the DOT, refers to this collective description of a number of individual jobs performed, with minor variations, in many establishments.

There are six basic parts to an occupational definition. They present data about a job in a systematic fashion. The parts are listed below in the order in which they appear in every definition:

(1) The Occupational Code Number
(2) The Occupational Title
(3) The Industry Designation
(4) Alternate Titles (if any)
(5) The Body of the Definition
    (a) Lead statement
    (b) Task element statements
    (c) "May" items
(6) Undefined Related Titles (if any)

A typical DOT definition (with each of the six parts labeled) is analyzed on the following page:

PARTS OF A DOT DEFINITION


1) Occupational Code
2) Occupational Title
3) Industry Designation
4) Alternate Titles
652.382-010 CLOTH PRINTER (any ind.) printer; printing-machine operator.
Sets up and operates machine to print designs on materials, such as cloth, fiberglass, plastics sheeting, coated felt, or oilcloth: Turns handwheel to set pressure on *printing rollers*, according to specifications. Turns screws to aline register marks on printing rollers with registration marks on machine, using alien wrench. Sharpens *doctor*, using file and oilstone, and verifies evenness of blade, using straightedge. Alines doctor against printing roller, using handtools. Dips color from tubs into color boxes to supply printing rollers. Scans cloth leaving machine for printing defects, such as smudges, variations in color shades, and designs that are out of register (alinement). Realines printing rollers and adjusts position of *blanket* or back-grey cloth to absorb excess color from printing rollers. Records yardage of cloth printed. Coordinates printing activities with workers who feed and doff machine and aid in setting up and cleaning machine. May mix COLORIST (pro'ess. & kin.) when color shade varies from specifications. May mix own colors. May mount printing rollers on machine for change of pattern (PRINTING-ROLLER HANDLER (textile)) May position knives specified distance from edge of plastics material to trim excess material from edges. When printing samples of new patterns and novelty designs is designated as NOVELTY-PRINTING-MACHINE OPERATOR (textile) or PROOFING-MACHINE OPERATOR (print. & pub.). May set up and operate cloth printing machine utilizing caustic soda paste instead of color paste to print designs on cloth which shrink to form *plisse*, and be designated PLISSE-MACHINE OPERATOR (textile).
5a) Lead Statement
5b) Task Element Statements
5c) "May" Items
6) Undefined Related Titles
Glossary Terms
Unbracketed Title
Bracketed Title

(1) The Occupational Code Number

The first item in an occupational definition is the 9-digit occupational code (in the example, 652.382-010). In the DOT occupational classification system, each set of three digits in the 9-digit code number has a specific purpose or meaning. Together, they provide a unique identification code for a particular occupation which differentiates it from all others.

The *first three digits* identify a particular occupational group. All occupations are clustered into one of nine broad "categories" (first digit), such as professional, technical and managerial, or clerical and sales occupations. These categories break up into 82 occupationally specific "divisions" (first two digits), such as occupations in architecture and engineering within the professional category, or stenography, typing, filing and related occupations in the clerical and sales category. Divisions, in turn, separate into small, homogeneous "groups" (first three digits)—559 such groups are identified in the DOT. The nine primary occupational categories are listed below:

0/1 Professional, Technical, and Managerial Occupations
2 Clerical and Sales Occupations

3 Service Occupations
4 Agricultural, Fishery, Forestry, and Related Occupations
5 Processing Occupations
6 Machine Trades Occupations
7 Bench Work Occupations
8 Structural Work Occupations
9 Miscellaneous Occupations

In the example, the first digit (6) indicates that this particular occupation is found in the category, "Machine Trades Occupations."[2]

The second digit refers to a division within the category. The divisions within the "Machines Trades Occupations" category are as follows:

60 Metal Machining Occupations
61 Metalworking Occupations, n.e.c.
62/63 Mechanics and Machinery Repairers
64 Paperworking Occupations
65 Printing Occupations
66 Wood Machining Occupations
67 Occupations in Machining Stone, Clay, Glass and Related Materials
68 Textile Occupations
69 Machine Trades Occupations, n.e.c.[3]

In the example, the second digit (5) thus locates the occupation in the "Printing Occupations" division.

The third digit defines the occupational group within the division. The groups within the "Printing Occupations" division are as follows:

650 Typesetters and Composers
651 Printing Press Occupations
652 Printing Machine Occupations
653 Bookbinding-Machine Operators and Related Occupations
654 Typecasters and Related Occupations
659 Printing Occupations, n.e.c.

The third digit in the example (2) locates the occupation in the "Printing Machine Occupations" group.

The *middle three digits* of the DOT occupational code are the worker functions ratings of the tasks performed in the occupation. Every job requires a worker to function to some degree in relation to data, people, and things. A separate digit expresses the worker's relationship to each of these three groups:

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[2]For a listing of all occupational categories, divisions, and groups see p. xxxiv.

[3]Some divisions or groups end in the designation "n.e.c." (not elsewhere classified). This indicates that the occupations do not logically fit into more precisely defined divisions or groups, or that they could fit into two or more of them equally well.

DATA (4th Digit)	*PEOPLE* (5th Digit)	*THINGS* (6th Digit)
0 Synthesizing	0 Mentoring	0 Setting Up
1 Coordinating	1 Negotiating	1 Precision Working
2 Analyzing	2 Instructing	2 Operating-Controlling
3 Compiling	3 Supervising	3 Driving-Operating
4 Computing	4 Diverting	4 Manipulating
5 Copying	5 Persuading	5 Tending
6 Comparing	6 Speaking-Signalling	6 Feeding-Offbearing
	7 Serving	7 Handling
	8 Taking Instructions-Helping	

Worker functions involving more complex responsibility and judgment are assigned lower numbers in these three lists while functions which are less complicated have higher numbers. For example, "synthesizing" and "coordinating" data are more complex tasks than "copying" data; "instructing" people involves a broader responsibility than "taking instructions-helping"; and "operating" things is a more complicated task than "handling" things.

The worker functions code in the example (382) relates to the middle three digits of the DOT occupational code and has a different meaning and no necessary connection with group code 652 (first three digits).

The worker functions [4] code (382) may relate to any occupational group. It signifies that the worker is "compiling" in relation to data (3); "taking instructions-helping" in relation to people (8); and "operating-controlling" in relation to things (2). The worker functions code indicates the broadest level of responsibility or judgment required in relation to data, people, or things. It is assumed that, if the job requires it, the worker can generally perform any higher numbered function listed in each of the three categories.

The *last three digits* of the occupational code number indicate the alphabetical order of titles within 6-digit code groups. They serve to differentiate a particular occupation from all others. A number of occupations may have the same first six digits, but no two can have the same nine digits. If a 6-digit code is applicable to only one occupational title, the final three digits assigned are always 010 (as in the example). If there is more than one occupation with the same first six digits, the final three digits are usually assigned in alphabetical order of titles in multiples of four (010, 014, 018, 022, etc.). If another printing machine occupation had the same six digits as CLOTH PRINTER (any ind.), and began with the letter "D" it would be assigned the occupational code 652.382-014.

The full nine digits thus provide each occupation with a unique code suitable for computerized operations.

(2) The Occupational Title

Immediately following the occupational code in every definition is the occupational base title. The base title is always in upper-case boldface letters. It is the most common type of title found in the DOT, and is the title by which the occupation is known in the majority of establishments in which it was found. In the example, CLOTH PRINTER (any ind.) is a base title.

[4] See appendix for more detailed discussion of worker functions codes.

Some titles are classified as *master titles*. These titles are designed to eliminate unnecessary repetition of tasks common to a large number of occupations. Master titles define the common job tasks having a wide variety of job variables and a wide variety of titles. An example is the title "SUPERVISOR (any ind.)." Each individual supervisory occupation has its own separate definition in the DOT describing its unique duties, but at the end of the definition the reader is referred back to the master definition (in this case, by a sentence reading "Performs other duties as described under SUPERVISOR (any ind.)." By referring to this master definition, the user will learn about the typical supervisory duties which any individual supervisor also performs.

Another type of DOT title is a *term title*. These include occupations with the same title but few common duties. An example of a term definition is:

> CONSULTING ENGINEER (profess. & kin.): A term applied to workers who consult with and advise clients on specialized engineering matters in a particular field of endeavor, such as chemical engineering, civil engineering, or mechanical engineering.

Since neither master nor term definitions are occupations, they are not coded in the occupational group arrangement but are found in separate sections of the DOT (see Contents).

There are other major types of titles used in the DOT, including *alternate titles* and *undefined related titles*. These are discussed later in this subsection of the Introduction.

(3) Industry Designation

The industry designation is in parentheses immediately following the occupational base title. It often differentiates between two or more occupations with identical titles but different duties. Because of this, it is an integral and inseparable part of any occupational title. An industry designation often tells one or more things about an occupation such as:

-location of the occupation (hotel & rest.; mach. shop)
-types of duties associated with the occupation (clean., dye. & press.; education)
-products manufactured (textile; optical goods)
-processes used (electroplating; petrol. refin.)
-raw materials used (nonfer. metal alloys; stonework)

While a definition usually receives the designation of the industry or industries in which it occurs, certain occupations occur in a large number of industries. When this happens, the industry is assigned a cross-industry designation. For example, clerical occupations are found in almost every industry. To show the broad, cross-industry nature of clerical occupations, "clerical" is an industry designation in itself. Among other cross-industry designations are: "profess. & kin.," "mach. shop," and "woodworking."

Occupations which occur in a number of industries, but are not found so widely as to warrant their own industry designation, are given the designation of "any industry." The job title in the example is given this designation. It should always be given as CLOTH PRINTER (any ind.).[5]

[5]In compiling information for the DOT, analysts were not able to study each occupation in all industries where it occurs. The industry designation, therefore, shows in what industries the occupation was studied but does not mean that it may not be found in others. Therefore, industry designations are to be regarded as indicative of industrial location, but not necessarily restrictive.

(4) Alternate Titles

An alternate title is a synonym for the base title. It is not as commonly used as the base title. Alternate titles are shown in lower-case boldface letters immediately after the base title and its industrial designation. In our example, two alternate titles are given: "printer" and "printing-machine operator." Alternate titles may not be used by public employment service offices in assigning occupational classifications. Alternate titles are cross-referenced to their base titles in the Alphabetical Index of Occupational Titles (p. 965). A particular occupation may have a large number of alternate titles or none at all. Alternate titles carry the code numbers and industry designations of the base title.

(5) The Body of the Definition

The body of the definition usually consists of two or three main parts: a lead statement, a number of task element statements, and a third part known as a "may" item.

(a) The Lead Statement

The first sentence following the industry designation and alternate titles (if any) is the lead statement. It is followed by a colon (:). The lead statement summarizes the entire occupation. It offers essential information such as:

-worker actions
-the objective or purpose of the worker actions
-machines, tools, equipment, or work aids used by the worker
-materials used, products made, subject matter dealt with, or services rendered
-instructions followed or judgments made

In the example, the sentence "Sets up and operates machine to print designs on materials such as cloth, fiberglass, plastics sheeting, coated felt, or oilcloth:" is the lead statement. From it, the user can obtain an overview of the occupation.

(b) Task Element Statements

Task element statements indicate the specific tasks the worker performs to accomplish the overall job purpose described in the lead statement. The sentences in the example beginning with "Turns handwheel. . .", "Turns screws . . .", "Sharpens doctor . . .", "Alines doctor . . .",[6] "Dips color . . .", etc. are all task element statements. They indicate how the worker actually carries out his or her duties.

(c) "May" Items

Many definitions contain one or more sentences beginning with the word "May." They describe duties required of workers in this occupation in some establishments but not in others. The word "May" does *not* indicate that a worker will sometimes perform this task but rather that some workers in different establishments generally perform one of

[6]The spelling of certain words in the DOT (such as "aline" in the example) conform to *U.S. Government Printing Office Style Manual* regulations. See Glossary for explanation of specialized meaning of the word "doctor" in this context.

the varied tasks listed. In the example, the three sentences beginning "May notify . . .", "May mount . . .", "May position . . .", are "May" items.[7]

The definition also contains a number of additional information elements designed to assist the user. Among these elements are:

Italicized words: Any words in a definition shown in italics are defined in the "Glossary" (p. 947). They are technical terms or special uses of terms not ordinarily found in a standard dictionary (in the example, the words "printing rollers," "doctor," and "blanket" are italicized. Their precise meaning can be found in the "Glossary").

Bracketed titles: A bracketed title indicates that the worker in the base title occupation performs some duties of the bracketed occupation as a part of his regular duties. In the example, the CLOTH PRINTER (any ind.) "May mount printing rollers . . . ." Since this task is usually performed by a PRINTER-ROLLER HANDLER (textile), this occupation is bracketed. To learn more about this particular aspect of the occupation, the user can look up the bracketed occupational title.

Unbracketed titles: Unbracketed titles are used for occupations whose workers have a frequent working relationship with workers in the occupation being defined. In the example, the CLOTH PRINTER (any ind.) may have a close working relationship with a COLORIST (profess. & kin.). This unbracketed title is therefore included in the definition.

Roman numerals: Several somewhat different occupations with the same job title may be found in the same industry. In this event, a Roman numeral follows each title and industry designation. For example, there are three titles in the DOT listed as ASSEMBLER (firearms). In order to distinguish between them, a Roman numeral is assigned to each one (ASSEMBLER (firearms) I, ASSEMBLER (firearms) II, etc.). There is no necessary connection in the sequence of these numbers with the level of complexity of these occupations or the frequency with which they occur in the U.S. economy.

Statement of significant variables: Another element found in some definitions is a statement of significant variables. It appears near the end of a definition and shows the possible variations in jobs that a particular definition can cover. This eliminates the need to include a large number of almost identical definitions in the DOT. The statement begins with "Important variations include. . . ." There is no statement of significant variables in the definition of CLOTH PRINTER (any ind.).

(6) Undefined Related Titles

Undefined related titles, if applicable, appear at the end of the occupational definition, in all capital letters, preceded by the phrase, "May be designated according to. . ." (or a similar phase). In the example, three undefined related titles, are given: NOVELTY-PRINTING-MACHINE-OPERATOR (textile), PROOFING-MACHINE OPERATOR (print. & pub.), and

[7]Do not confuse "May" items with the "May be designated. . ." sentence which introduced undefined related titles.

PLISSE-MACHINE OPERATOR (textile). This type of title is for an occupation that is really a variation or specialization of the base occupation. It resembles the base enough to accompany it, but differs from it enough to require an explanatory phrase and its own unique title. An undefined related title takes the same code as its base title. Undefined related titles found in occupational definitions are also listed in the Alphabetical Index of Occupational Titles with their industry designation and the 9-digit codes of their base titles. In addition, they appear in the list of Occupational Titles Arranged by Industry Designation in alphabetical order with 9-digit base title codes, within the appropriate industry.

APPENDIX

Explanation of Data, People and Things

Much of the information in this publication is based on the premise that every job requires a worker to function in some degree to Data, People and Things. These relationships are identified and explained below. They appear in the form of three listings arranged in each instance from the relatively simple to the complex in such a manner that each successive relationship includes those that are simpler and excludes the more complex.[1] The identifications attached to these relationships are referred to as worker functions, and provide standard terminology for use in summarizing exactly what a worker does on the job.

A job's relationship to Data, People and Things can be expressed in terms of the lowest numbered function in each sequence. These functions taken together indicate the total level of complexity at which the worker performs. The fourth, fifth and sixth digits of the occupational code numbers reflect relationships to Data, People and Things, respectively.[2] These digits express a job's relationship to Data, People and Things by identifying the highest appropriate function in each listing as reflected by the following table:

DATA (4th digit)	PEOPLE (5th digit)	THINGS (6th digit)
0 Synthesizing	0 Mentoring	0 Setting-Up
1 Coordinating	1 Negotiating	1 Precision Working
2 Analyzing	2 Instructing	2 Operating-Controlling
3 Compiling	3 Supervising	3 Driving-Operating
4 Computing	4 Diverting	4 Manipulating
5 Copying	5 Persuading	5 Tending
6 Comparing	6 Speaking-Signaling	6 Feeding - Offbearing
	7 Serving	7 Handling
	8 Taking Instructions - Helping	

Definitions of Worker Functions

DATA: Information, knowledge, and conceptions, related to data, people, or things, obtained by observation, investigation, interpretation, visualization, and mental creation. Data are intangible and include numbers, words, symbols, ideas, concepts, and oral verbalization.

0 Synthesizing: Integrating analyses of data to discover facts and/or develop knowledge concepts or interpretations.

1 Coordinating: Determining time, place, and sequence of operations or action to be taken on the basis of analysis of data; executing determination and/or reporting on events.

2 Analyzing: Examining and evaluating data. Presenting alternative actions in relation to the evaluation is frequently involved.

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[1]As each of the relationships to People represents a wide range of complexity, resulting in considerable overlap among occupations, their arrangement is somewhat arbitrary and can be considered a hierarchy only in the most general sense.

[2]Only those relationships which are occupationally significant in terms of the requirements of the job are reflected in the code numbers. The incidental relationships which every worker has to Data, People, and Things, but which do not seriously affect successful performance of the essential duties of the job, are not reflected.

3 Compiling: Gathering, collating, or classifying information about data, people, or things. Reporting and/or carrying out a prescribed action in relation to the information is frequently involved.

4 Computing: Performing arithmetic operations and reporting on and/or carrying out a prescribed action in relation to them. Does not include counting.

5 Copying: Transcribing, entering, or posting data.

6 Comparing: Judging the readily observable functional, structural, or compositional characteristics (whether similar to or divergent from obvious standards) of data, people, or things.

PEOPLE: Human beings; also animals dealt with on an individual basis as if they were human.

0 Mentoring: Dealing with individuals in terms of their total personality in order to advise, counsel, and/or guide them with regard to problems that may be resolved by legal, scientific, clinical, spiritual, and/or other professional principles.

1 Negotiating: Exchanging ideas, information, and opinions with others to formulate policies and programs and/or arrive jointly at decisions, conclusions, or solutions.

2 Instructing: Teaching subject matter to others, or training others (including animals) through explanation, demonstration, and supervised practice; or making recommendations on the basis of technical disciplines.

3 Supervising: Determining or interpreting work procedures for a group of workers, assigning specific duties to them, maintaining harmonious relations among them, and promoting efficiency. A variety of responsibilities is involved in this function.

4 Diverting: Amusing others. (Usually accomplished through the medium of stage, screen, television, or radio.)

5 Persuading: Influencing others in favor of a product, service, or point of view.

6 Speaking-Signaling: Talking with and/or signaling people to convey or exchange information. Includes giving assignments and/or directions to helpers or assistants.

7 Serving: Attending to the needs or requests of people or animals or the expressed or implicit wishes of people. Immediate response is involved.

8 Taking Instructions-Helping: Helping applies to "non-learning" helpers. No variety of responsibility is involved in this function.

THINGS: Inanimate objects as distinguished from human beings, substances or materials; machines, tools, equipment and products. A thing is tangible and has shape, form, and other physical characteristics.

0 Setting up: Adjusting machines or equipment by replacing or altering tools, jigs, fixtures, and attachments to prepare them to perform their functions,

change their performance, or restore their proper functioning if they break down. Workers who set up one or a number of machines for other workers or who set up and personally operate a variety of machines are included here.

1 Precision Working: Using body members and/or tools or work aids to work, move, guide, or place objects or materials in situations where ultimate responsibility for the attainment of standards occurs and selection of appropriate tools, objects, or materials, and the adjustment of the tool to the task require exercise of considerable judgment.

2 Operating-Controlling: Starting, stopping, controlling, and adjusting the progress of machines or equipment. Operating machines involves setting up and adjusting the machine or material(s) as the work progresses. Controlling involves observing gages, dials, etc., and turning valves and other devices to regulate factors such as temperature, pressure, flow of liquids, speed of pumps, and reactions of materials.

3 Driving-Operating: Starting, stopping, and controlling the actions of machines or equipment for which a course must be steered, or which must be guided, in order to fabricate, process, and/or move things or people. Involves such activities as observing gages and dials; estimating distances and determining speed and direction of other objects; turning cranks and wheels; pushing or pulling gear lifts or levers. Includes such machines as cranes, conveyor systems, tractors, furnace charging machines, paving machines and hoisting machines. Excludes manually powered machines, such as handtrucks and dollies, and power assisted machines, such as electric wheelbarrows and handtrucks.

4 Manipulating: Using body members, tools, or special devices to work, move, guide, or place objects or materials. Involves some latitude for judgment with regard to precision attained and selecting appropriate tool, object, or material, although this is readily manifest.

5 Tending: Starting, stopping, and observing the functioning of machines and equipment. Involves adjusting materials or controls of the machine, such as changing guides, adjusting timers and temperature gages, turning valves to allow flow of materials, and flipping switches in response to lights. Little judgment is involved in making these adjustments.

6 Feeding-Offbearing: Inserting, throwing, dumping, or placing materials in or removing them from machines or equipment which are automatic or tended or operated by other workers.

7 Handling: Using body members, handtools, and/or special devices to work, move, or carry objects or materials. Involves little or no latitude for judgment with regard to attainment of standards or in selecting appropriate tool, object, or material.

Individual Study Activity Responses

The answers that follow will give you an idea of the type of response expected. Use them as a study tool if you wish.

GOAL 1

1. The specific response to this activity depends on the particular occupation you selected. Regardless of the specific occupation, however, a job description is considered adequate when it contains a general statement of each kind of activity a person engages in during his or her performance of the job, and when it suggests the special or unusual conditions associated with the performance of the job. A job description is usually several paragraphs in length. Pages 8 and 9 of Mager and Beach, Developing Vocational Instruction, provide five examples of job descriptions.

2. The specific response to this activity depends on the particular occupation you selected and the corresponding job description in the Dictionary of Occupational Titles. If you were unable to locate a job description in the DOT for the occupation you selected, consider the following possibilities:

    - The occupation you selected may be a relatively new or emerging occupation not yet included in the DOT.
    - The occupation you selected may be obsolete and no longer included in the DOT.
    - The occupation you selected may be specific to a particular community or locale and therefore not included in the DOT.

3. The specific response to this activity depends on the particular occupation you selected. The task listing for this occupation should reflect all the tasks that make up the job. For each task listed, you should have noted:

    - how often each task is performed during the performance of the job,
    - the relative importance of the task among all tasks that make up the job, and

- the level of difficulty involved for the student in learning how to perform the task.

Page 15 in Mager and Beach, Developing Vocational Instruction, provides an example of a task listing for the job of electronics technician.

4. The specific response to this activity depends on the particular occupation you selected. Your task statements should contain:

   - an action verb, indicating what a person does on the job,
   - an object, indicating the element that is acted upon by the person doing the job, and
   - a qualifier (when necessary), indicating the limitations or framework within which the job is performed.

   This module provides an example of the task statements for the occupation of painter broken down into action verbs, objects, and qualifiers.

5. The specific response to this activity depends on the particular occupation you selected. Your TASK DETAILING SHEET should list each of the steps involved in performing a task. These steps should be expressed in terms of what is done, rather than in terms of what must be known. You should also include those steps that cannot be seen directly, but that are nonetheless important in completing the task. The TASK DETAILING SHEET should also indicate the learning difficulty of each step, and the likelihood that the student will already be able to perform some of the steps when he or she arrives for instruction. Pages 21-24 of Mager and Beach, Developing Vocational Instruction, provide examples of TASK DETAILING SHEETS for four specific occupations.

6. The specific response to this activity depends on the particular occupation you selected. If you selected a task for school instruction, the reason for your selection should meet at least one of the following criteria:

   - The task is performed by a large percentage of the jobholders in this occupation.
   - The task is performed frequently.

- The task is critical to job accomplishment.
- The task is essential in performance of another task.
- The task is required immediately upon entry into the job.

If you selected a task for on-the-job training, the reason for your selection should meet at least one of the following criteria:

- The task is relatively easy to learn.
- The task is performed infrequently.
- The task is performed by a small percentage of jobholders in this occupation.

If you rejected a task for either school instruction or on-the-job training, the reason for your rejection should meet at least one of the following criteria:

- The task can he performed without further instruction.
- The task is similar to other tasks selected for instruction.

7. The specific response to this activity depends on the particular occupation you selected. In attempting to determine the prerequisites for a course that provides training for the occupation you selected, you might have considered:

- physical characteristics,
- learning abilities,
- basic skills, and
- work-related attitudes.

You should have also rated each of your prerequisites as to the degree of their importance. Page 38 of Mager and Beach, Developing Vocational Instruction, provides an example of prerequisites for a course that provides training for a television repairer.

8. The specific response to this activity depends on the particular vocational course you selected. In describing the major characteristics of the students in this course, you might have considered:

- physical characteristics,
- education,
- motivation,
- interests,
- biases and prejudices, and
- specific knowledge, skills, and attitudes relevant to the subject of the course.

Pages 26 and 27 in Mager and Beach, Developing Vocational Instruction, provide two examples that describe student characteristics in terms of the categories listed above.

GOAL 2

1. The literature on instructional objectives is filled with a variety of statements regarding their importance. According to Mager and Beach, objectives are important because:

- they form the basis from which the measuring instrument is prepared; the instrument then provides information for making decisions about the adequacy or inadequacy of student performance upon completion of instruction;
- by knowing course objectives, students will be better able to organize their learning activities and efforts; and
- objectives provide a document that can be used to demonstrate systematic development of instruction.

Other statements of importance from the literature are listed below.

- Definitions of objectives are necessary to guide the behavior of the teacher.

- Unless the objectives are known, it is impossible to know what the student's capabilities are at any given moment.

- An important reason for specifying objectives is so that the terminal behavior that is aimed for can be known to the instructional designer.

- Objectives are a convenient way for communicating intended achievements to others (superiors, subordinates, students, parents, etc.).

- Objectives increase the probability that the remedy (training, environmental changes, motivational systems, etc.) will be relevant to the problem.

2. (1) c
   (2) a
   (3) b
   (4) d
   (5) a
   (6) b
   (7) c
   (8) d
   (9) b
   (10) d
   (11) c
   (12) a

3. The specific response to this activity depends on the particular occupation you selected. Your instructional objectives should consist of the following parts:

   - the audience (<u>who</u> is to perform the desired behavior);

   - the specific <u>action</u> to be performed by the student;

   - the <u>conditions</u> under which the performance is to occur; and

   - the <u>criteria</u> of acceptable performance.

The form of your objectives is not the important thing--they may be stated in one sentence, in several, or as a list. The important concern is that your instructional intent is clear. Pages 32 and 33 in Mager and Beach, Developing Vocational Instruction, provide examples of objectives in various forms that all contain the essential components for a precisely stated instructional objective.

4. The specific response to this activity depends on individual preference.

5. The specific response to this activity depends on the particular vocational program area you selected and the sources of objectives that you located for this area.

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Self-Check

GOAL 1

1. What U.S. Employment Service publication is a major source of job descriptions for a wide variety of occupations?

2. What is the process used to determine the individual steps involved in the completion of a job?

3. What are the three major components of a task statement?

4. What are four major criteria for selecting a task for which school instruction should be provided?

5. What are two criteria for selecting a task for on-the-job training rather than school instruction?

6. What are four major characteristics to consider in describing a target population?

7. What is the purpose of determining course prerequisites?

GOAL 2

1. According to Mager, what are the three major components of an instructional objective?

2. Which component of an instructional objective does the following item represent? "Given one standard hospital bed in a patient care unit..."

3. Which component of an instructional objective does the following item represent? "Mark any errors in spelling, punctuation, capitalization, grammar, and format..."

4. What are three general sources for obtaining existing instructional objectives?

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Self-Check Responses

The answers that follow will give you an idea of the type of response expected. Use them as a study tool if you wish.

GOAL 1

1. Dictionary of Occupational Titles

2. Task analysis

3.
   - action verb
   - object
   - qualifier

4. Consider your answer correct if it includes any four of the following:
   - The task is performed by a large percentage of job-holders.
   - The task is performed frequently.
   - The task is critical to job accomplishment.
   - The task is essential in performance of another task.
   - The task is required immediately upon entry into the job.

5. Consider your answer correct if it includes any two of the following:
   - The task is relatively easy to learn.
   - The task is performed infrequently.
   - The task is performed by a small percentage of job-holders.

6. Consider your answer correct if it includes any four of the following:
   - Physical characteristics
   - Education

- Motivation
- Interests
- Biases or prejudices
- Specific knowledge, skills, and attitudes relevant to the subject of the course

7. To determine the abilities (knowledge, attitudes, and skills) that students must possess before entering the learning situation. Prerequisites indicate necessary student abilities for success in a course.

GOAL 2

1.
- the behavior or action performed by a student
- the conditions under which the performance is to occur
- the criteria or standards of acceptable performance

2. Conditions under which performance is to occur

3. Behavior or action performed by a student

4.
- curriculum guides and guides accompanying textbooks
- behavioral objectives bibliographies
- publications of professional associations: journal articles, or special issues on objectives for specific areas

Recommended References

1. Bloom, B. S. (Ed.). Taxonomy of educational objectives. New York: David McKay Company, 1967.

2. Bortz, R. F. A handbook for developing occupational curricula. Boston: Allyn & Bacon, 1981.

3. Butler, F. C. Instructional systems development for vocational and technical training. Englewood Cliffs, New Jersey: Educational Technology Publications, 1972.

4. Byers, E. E., & Huffman, H. H. Writing performance goals: Strategy and prototypes. New York: McGraw-Hill, 1971.

5. Claus, C. C. et al. National college verb list. In D. J. Pucel & W. C. Knaak, Individualizing vocational and technical instruction. Columbus, Ohio: Charles E. Merrill Publishing Company, 1975.

6. Cross, A. A. (Ed.). Vocational instruction (1980 Yearbook of the American Vocational Association). Arlington, Virginia: American Vocational Association, 1980.

7. Finch, C. R., & Crunkilton, J. R. Curriculum development in vocational and technical education. Boston: Allyn & Bacon, 1979.

8. Geis, G. L. Behavioral objectives: A selected bibliography and brief review. Stanford, California: ERIC Clearinghouse on Media and Technology, Stanford University, April 1972.

9. Goldstein, I. L. Training: Program development and evaluation. Monterey, California: Brooks/Cole Publishing Company, 1974.

10. Kibler, R. J., Barker, L. L., & Miles, D. T. Behavioral objectives and instruction. Boston: Allyn & Bacon, 1970.

11. Mager, R. F. Goal analysis. Belmont, California: Fearon Publishers, 1972.

12. Melching, W. H., & Borcher, S. D. Procedures for constructing and using task inventories. Columbus, Ohio: Ohio State University, Center for Vocational and Technical Education, March 1973.

13. Popham, W. J. The uses of instructional objectives: A personal perspective. Belmont, California: Fearon Publishers, 1973.

14. Silvern, L. C. Systems engineering of education XIX: Preparing occupational instruction. Los Angeles: Education and Training Consultants, 1977.

VECS Module Titles

Module 1: Vocational Educators and Curriculum Management

Module 2: The Scope of Vocational Education

Module 3: Organization of Vocational Education

Module 4: Legislative Mandates for Vocational Education

Module 5: Priorities in Vocational Education

Module 6: Vocational Education for Students with Special Needs

Module 7: Vocational Needs Assessment and Curriculum Development

Module 8: Conducting Task Analyses and Developing Instructional Objectives

Module 9: Selecting Instructional Strategies and Assessing Student Achievement

Module 10: Relating Learning Differences and Instructional Methods

Module 11: Selecting and Preparing Instructional Materials

Module 12: Evaluating Vocational Education Curricula

Module 13: Conducting Follow-Up Studies and Communicating Evaluation Results

Module 14: Managing Vocational Education Programs

Module 15: Preparing for Curriculum Change

Module 16: Staff Development